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ABSTRACT

This study examined how well adults can make inferences about children's cognitive abilities. Subjects (n=60) were four groups of adults: female parents, female nonparents, male parents, and male nonparents. They were shown the typical method of administering 13 Piagetian tasks, ranging from object permanence to the formal-operational pendulum task. For each task, subjects were asked about average age of mastery, variability in speed of development, possible sex differences, and developmental origins of the concept. Responses to the age question showed a tendency to overestimate ages for the developmentally earliest concepts and to underestimate ages (in some cases quite markedly) for the developmentally later concepts. Subjects were nevertheless fairly accurate in dating many concepts; they were also quite successful at identifying sequences in development, positioning a reversal in only 9 percent of the cases. Responses to the remaining questions varied to some extent across concept; subjects' general tendency, however, was to deemphasize sex differences and variability and to rate self-discovery as the most important contributor to development. Few differences between males and females or parents and nonparents were founded. (Author/RH)

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Adults' Conceptions of Children's Cognitive Abilities

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Running head: Adults' Conceptions of Children

Abstract

This study examined how well adults can make inferences about children's cognitive abilities. Subjects were four groups of adults: female parents, female nonparents, male parents, and male nonparents. They were shown the typical method of administering 13 Piagetian tasks, ranging from object permanence to the formal-operational pendulum task. For each task subjects were asked about average age of mastery, variability in speed of development, possible sex differences, and developmental origins of the concept. Responses to the age question showed a tendency to overestimate ages for the developmentally earliest concepts and to underestimate ages (in some cases quite markedly) for the developmentally later concepts. Subjects were nevertheless fairly accurate in dating many concepts; they were also quite successful at identifying sequences in development, positing a reversal in only 9% of the cases. Responses to the remaining questions varied to some extent across concept; subjects' general tendency, however, was to deemphasize sex differences and variability and to rate self-discovery as the most important contributor to development. Finally, there were few differences between males and females or parents and nonparents.

Adults' Conceptions of Children's Cognitive Abilities

The object of this research can be easily summarized: We were interested in what adults think about the development of thinking in children. Specifically, our focus was on adults' awareness of the various phenomena discovered by Piaget. Do adults realize, for example, that such basic concepts as object permanence and conservation are only gradually developed? Do they have some appreciation of the relative difficulty of different concepts and therefore the order in which children master them?

There are both theoretical and practical reasons for an interest in issues of this sort. Theoretically, the study falls under the general question of how people make sense of other people--a research area variously labeled as social cognition, person perception, or attribution. Research concerned with the understanding of other people has become quite popular in recent years, with both adults (e.g., Jones, 1979) and children (e.g., Shantz, 1975) as subjects. The present study differs from most such studies, however, in several respects. The focus on children as a target group for person perception is still relatively rare; the focus on intellectual abilities as the attribute of interest is also rare; and the focus on the specific abilities studied by Piaget is rarer still. Indeed, with one limited exception (Rubin & Brown, 1975), this study is the first to systematically examine what adults know about the cognitive abilities studied by Piaget.

It is by no means obvious how well adults might be expected to make the kinds of inferences studied here. On the one hand, it is generally agreed that the abilities studied by Piaget represent cen-

tral aspects of the child's cognitive functioning; in the sense they might seem likely foci for adults' judgments about children. Furthermore, children are in some respects familiar stimuli for any adult; every adult, after all, was once a child, and many adults interact quite frequently with children. On the other hand, it is also generally agreed that much of Piaget's work has served to reveal rather subtle and nonobvious aspects of children's functioning. Indeed, it is sometimes said (although never empirically demonstrated) that the work is interesting precisely because it surprises us so often. In addition, the marked developmental changes between childhood and adulthood would seem to assure that in some respects children constitute a quite distinct target group for any adult. The theoretical question of interest, then, is how well adults can make judgments about subtle (yet important) aspects of a target group that is in some respects familiar but in some respects quite different from themselves.

Adults' inferences about children's abilities are of interest not only in themselves but also with respect to their possible effect on how adults treat children. It seems reasonable to expect that what adults think about children's abilities will influence various aspects of their behavior toward children--the kinds of demands that they make of children, the things that they try to teach to them, the ways that they go about teaching, etc. This, in fact, was a finding in the Rubin and Brown (1975) study. They reported that a person's conceptions of how different target groups would perform on various cognitive tasks correlated with the complexity of communications that he or she directed toward those groups. The assumption of an attitude-

behavior link also underlies several recent studies of mother-infant interaction, in which the attempt is to alter maternal behavior through providing information about the child's capabilities (Anderson, Note 1; Eyler, Note 2).

We had three decisions to make about procedure. The first was whom to study, a decision that must be tied, of course, to some notion of the variables that might affect adults' conceptions of children. We decided to include both males and females, a comparison that is common not only in person perception research generally, but also in recent research on adult responsiveness to children (e.g., Feldman & Nash, 1978). We decided also to include both parents and nonparents, reasoning that parents, on the average, are more interested in children and have more experience with children. The combination of these two variables gave four groups: female parents, female nonparents, male parents, and male nonparents.

A second decision concerned which Piagetian concepts to study. We were guided by several criteria in selecting concepts. We wished to work with tasks that were clearly important, that spanned the four periods of development, that could be easily demonstrated to our subjects, and for which there were fairly good normative data. Thirteen concepts were selected, including two from the sensorimotor period, three from the preoperational period, six from the concrete operational period, and two from the formal operational period.

The final decision concerned what to ask about performance on each task. We decided to ask about a number of aspects of development that developmental psychologists have been interested in studying. Questions were directed, therefore, to the average age at which the

ability is mastered, the extent of variability in speed of development, the probability of sex differences in development, and the developmental origins of the knowledge in question. Note that direct questions of this sort also yield certain derived measures; for example, the age judgments can provide information about subjects' ability to appreciate sequences in the development of knowledge.

Method

Subjects

The subjects were 60 adults, recruited on a voluntary basis from personnel rolls of the city of Gainesville and the University of Florida. They were equally divided among four groups: female parents, female nonparents, male parents, and male nonparents. The criterion for inclusion in the parent group was that the subject have at least one child between the ages of 6 and 16. The criterion for inclusion in the nonparent group was that the subject be between the ages of 23 and 50 (to assure rough matching of age with the parents). Table 1 indicates the standing of the four groups on various measures of interest.

Insert Table 1 about here

It should be noted that the sample was in some respects a self-selected one. Only about 15% of those contacted in an initial mailing agreed to participate. It should also be noted, however, that posttest questioning indicated that only a handful of subjects had had specific course work that might have affected their response to the questions.

Procedure

All testing was done by two female graduate students. With a

few exceptions, testing took place in the subjects' homes. When both husband and wife participated, they generally were tested simultaneously in different rooms by different experimenters. In the few cases in which this was not possible, one spouse was tested immediately after the other.

Before testing began, all subjects received two brief written descriptions of the general purpose and procedures of the research, one in the initial letter soliciting participation and the other in the informed consent form. The experimenter began by reiterating this general information: that the study was concerned with what adults thought about children's thinking; that the focus was on children in general and not specific children, including one's own; and that there were no clear-cut right or wrong answers. The experimenter went on to explain that she would be demonstrating a number of tasks that were used in the study of children's thinking, and that after each she would ask various questions about how children might be expected to perform on the task. The response sheet was then presented, and each of the questions to be asked was introduced.

There were five such questions, each with a corresponding place to fill in on the answer sheet. The first concerned the "average age at which children in our society master the concept." The subject was told that the age could be expressed in months as well as years, that "birth" could be entered if the knowledge was always present, and that "adulthood" or "never" could be used if appropriate. The second question asked for a confidence estimate with respect to the age judgment. A 5-point-scale was used, ranging from "Very Unsure"

through "Moderately Sure" to "Very Sure."

The next two questions were concerned with possible individual differences in development. The third question asked about variability in speed of development. The response sheet included columns for "Youngest Age" at which at least some children would understand the concept and "Oldest Age" at which the slowest children would come to understand the concept. It was stressed that the interest was in the normal range of variation; thus brain-damaged children, for example, were to be excluded. The fourth question was directed to possible sex differences in speed of development. The subject was asked to make a choice among three possibilities: "Boys and Girls Equal," "Boys Faster," or "Girls Faster." It was stressed here that the interest was in average differences between the sexes, and not necessarily an across-the-board superiority of one sex or the other.

The final question concerned the origins of the knowledge in question. Five possibilities were offered: "Parental Teaching," "School Teaching," "Interaction with Peers," "Self Discovery" and Inborn Knowledge." In each case, the experimenter provided a brief explanation of what was meant by the category. The explanation for "Self Discovery" stressed that the relevant experience need not be totally separate from the other contexts (it might occur in school, for example, or with peers); what was important was that the new insight came mainly at the child's initiative. The explanation for "Inborn Knowledge" stressed that the knowledge need not be present or demonstrable at birth; what was important was that it develop largely through biological-maturational processes rather than specific

experience. For each possible contributing factor, the subject was asked to assign a rating of either 1 ("Very Important"), 2 ("Moderately Important"), or 3 ("Unimportant").

Once the different categories on the response sheet had been introduced, the subject was asked whether he or she had any questions before beginning. The experimenter added that questions could also be asked at any point during the test, should the subject become confused about some aspect of the procedure. Subjects were explicitly told that they could ask about their response to earlier items when responding to later ones, if they thought that reference to an earlier answer might be helpful but were no longer certain what that answer had been.

The order of presentation of the 13 Piagetian concepts was randomized across subjects. In each case, the experimenter presented the task in a manner similar to that typically used in studies with children. For the most part, the stimuli were identical to those typically used with children. The exceptions were the conservation-of-weight problem, on which the use of the balance was described rather than demonstrated, and the pendulum problem, on which a picture of the stimuli was substituted for the actual objects. The wording was altered from the direct questions appropriate for children to a more general description of the experimenter's actions and questioning (e.g., "then the tester flattens one of the pieces, like this, and asks the child, 'do they still weigh the same or does one weigh more than the other?'"). To avoid possible uncertainty on some of the more difficult tasks, the experimenter routinely added, "and the correct answer is...."

The 13 Piagetian concepts were the following:

1. Object Permanence, One Hiding Place (O-1). Small toy hidden under a cup while the child watches; 3 sec delay imposed; question concerns the age at which the child can reach directly for the cup and find the toy.
2. Object Permanence, Two Hiding Places (O-2). Small toy hidden under a cup twice and child allowed to retrieve it; toy then hidden under a second cup while the child watches; question concerns the age at which the child can reach directly for the second cup to find the toy.
3. Role-Taking, Two Pictures (RT-2). Child shown board with picture of a kitten on one side and a puppy on the other; board held vertically between experimenter and child so that each sees a different picture; question concerns the age at which the child can correctly identify which picture the experimenter sees.
4. Role-Taking, One Picture (RT-1). Child shown picture of a puppy in both right side up and upside down orientations; picture is then laid flat between experimenter and child so that it is right side up for child; question concerns the age at which the child realizes that the picture is upside down for the experimenter.
5. Qualitative Identity (QI). Child shown a glass of water which is then poured into a different-shaped container; question concerns the age at which the child realizes that the water is the same water as in the original container.
6. Seriation (S). Nine sticks of different lengths presented in random order; question concerns the age at which the child can successfully order the sticks from smallest to largest.

7. Class Inclusion (CI). Child shown a bunch of wooden beads, six of which are red and two of which are blue; question concerns the age at which the child realizes that there are more wooden beads than red beads.
8. Conservation of Liquid (CL). Child shown two glasses with equal amounts of water; one is then poured into a different-shaped container; question concerns the age at which the child realizes that the amounts are still equal.
9. Conservation of Mass (CM). Child shown two balls of clay with equal amounts of clay; one is then flattened; question concerns the age at which the child realizes that the amounts are still equal.
10. Conservation of Weight (CW). Child shown that two balls of clay weigh the same on a balance scale; one is then flattened; question concerns the age at which the child realizes that the weights are still equa.
11. Horizontality (H). Child shown a drawing of a bottle that is tilted on a table and asked to draw in the way the water would look if the bottle were half filled; question concerns the age at which the child realizes that the water would be parallel to the table.
12. Conservation of Volume (CV). Child shown that two balls of clay displace the same amount of water; one is then flattened; question concerns the age at which the child realizes that the amounts displaced are still equal.
13. Pendulum (P). Child given a series of four small weights and an apparatus with a string which can be adjusted to different lengths;

task is to experiment with the materials and to determine which of several variables influence the speed at which the pendulum swings; question concerns the age at which the child can systematically vary the variables to determine the correct answer.

Results

Performance was examined as a function of two main kinds of independent variable: those concerned with the nature of the subject, and those concerned with the nature of the concept being asked about. For each of the various dependent variables, a single univariate analysis of variance was performed, with sex and parental status as between-subject factors and the 13 Piagetian concepts as a within-subject factor. On analyses involving the repeated dimension of concept, the degrees of freedom were adjusted by the epsilon correction factor (McCall & Applebaum, 1973) to control for inflated alpha level with heterogeneous variances and covariances.

The simultaneous consideration of all three independent variables permitted a determination not only of main effects but also of possible interactions between subject group and Piagetian concept. In fact, however, there were only two significant group by concept interactions out of 27 possible instances. Consequently, the discussion that follows treats the subject analyses and the concept analyses separately.

Descriptive Information

We will begin with some descriptive information concerning responses for the sample as a whole summed across all 13 concepts. The relevant data can be seen in both Table 2, which presents response as a function of subject group, and Table 3, which presents response as a function of concept.

Insert Tables 2 and 3 about here

The first column in Table 2 indicates the mean age of attainment assigned to each of the concepts. It can be seen that the subjects, as a group, were clearly aware that the different concepts emerge at different points in development, and were at least roughly accurate in assigning ages to particular concepts. The accuracy was only rough, however, the tendency being to overestimate the difficulty of the developmentally early concepts, in particular the two object permanence items, and to underestimate the difficulty of the developmentally later concepts. In some cases the underestimation was quite marked; note, for example, the means of 7.59 and 10.38 for the formal-operational volume and pendulum tasks, figures which are probably at least 4 or 5 years below the actual norms. (Such group averages, of course, do not indicate how accurate individual subjects were. The question of individual accuracy will be returned to shortly.)

The results to be discussed next are presented in both Tables 2 and 3 but are probably more easily read in Table 3. Subjects were moderately certain in their age judgments, averaging 3.06 on the 5-point certainty scale. The posited variability in speed of development was 2.92 years, a figure which is probably a slight underestimation of the actual variability in how quickly children develop. Sex differences were not seen as being very frequent, subjects indicating no difference between the sexes on 79% of the trials. Finally, the category of self discovery was rated as the most important of the five contributors to development, and the category of inborn knowledge was rated as the least important. Pairwise comparisons were made among the five cate-

gories, using the Wilcoxon signed ranks test with alpha adjusted to .005 to control for inflated alpha with multiple comparisons (Marascuilo & McSweeney, 1977). The following differences were significant: self discovery more important than every other category except parental teaching; inborn knowledge less important than every other category except interaction with peers; parental teaching and school teaching both more important than interaction with peers.

Comparisons among Concepts

We turn now to the question of whether response differed as a function of the particular concept that was being asked about. We have already noted that the posited age of attainment varied substantially, and for the most part sensibly, across the different concepts; it can be added now that these differences in hypothesized age were highly significant ($F = 119.51$). Similar analyses of variance were performed on each of the other eight dependent variables listed in Table 2, in each case using the appropriate epsilon correction figure for repeated measures. Significant main effects of concept emerged for all eight variables (all F's ≤ 2.09, all adjusted df's $\leq 4, 227$, all p's $< .05$). Follow-up comparisons were made by means of Duncan's procedure, again with the epsilon adjustment in the degrees of freedom. Space limits preclude a full presentation of these follow-ups, but the most important general conclusions can be indicated.

Before summarizing results from the follow-ups, it is reasonable to ask about possible differences among the concepts that might relate to differences in response. Certainly the most obvious such difference concerns the developmental level necessary for mastery. On four of the dependent measures the variance in response was clearly related

to the developmental level of the concept. Thus, both variability in development and the probability of sex differences were seen as increasing as the developmental level of the concept increased. In both cases, significant differences between concepts were considerably more likely for between-stage than within-stage comparisons. In both cases, the developmentally most advanced concept, the formal-operational pendulum problem, differed significantly from all other concepts. Conversely, in the case of the variability measure the least advanced concept, object permanence-1, differed from all other concepts except object permanence-2.

One further finding should be mentioned with regard to sex differences. On trials on which a sex difference was posited the two sexes split almost evenly, girls being selected as faster 52% of the time and boys 48%. For the most part, the pattern of choice was similar across concepts, girly enjoying a slight superiority on most of the tasks. The one clear exception was provided by the pendulum problem: Of the 32 subjects who indicated a sex difference on this task, 26 selected boys as faster.

Of the significant differences on the five origins-of-knowledge categories, two appear clearly related to developmental level. In both cases, the pattern of response was quite sensible: The importance of school teaching was seen as increasing with developmental level, and the importance of inborn knowledge was seen as decreasing. Somewhat similar trends can be discerned for the peers and self discovery categories, but the effects of developmental level were much less clear-cut on these measures. The significant differences on the parental teaching measure did not follow any clearly interpretable pattern.

It can be noted finally that the significant effect on the cer-

tainty measure resulted from the relatively high certainty for the two object permanence items. Certainty ratings were significantly higher for these items than for any of the other concepts except seriation; there were no differences among the 11 post-infancy concepts. It is interesting to note that this relatively strong certainty came about despite the fact that accurate age judgments were less common on the object permanence tasks than on any other concept.

Comparisons among Groups

The means in Table 3 suggest that the different subject groups responded in a very similar fashion, and this suggestion is confirmed by the analyses of variance. There was only one significant main effect of either sex or parental status across the nine dependent variables: Males posited greater variability in development than did females, F (1,54) = 5.06, $p < .05$. There was also only one significant interaction of sex and parental status; it occurred on the measure of sex differences and resulted from the relatively high proportion of such differences claimed by female parents and male nonparents, F (1,56) = 4.02, $p < .05$.

The analyses just discussed are based on a direct tabulation of the various judgments given, and as such they leave an important question unanswered: How accurate were subjects in making their judgments? Perhaps there are differences in accuracy among groups that are not captured by the direct measures of Table 3. And group differences aside, some consideration of accuracy is a necessary supplement to the descriptive information provided earlier.

A consideration of accuracy assumes that we possess enough knowledge to evaluate how accurate the subjects were. In some cases, most notably the question of where knowledge comes from, we simply do

not know enough to assess accuracy. In some cases we do, however, and several such measures are summarized in Table 4.

Insert Table 4 about here

The first three columns in the table indicate how successful subjects were at identifying sequences in development. Among the 13 concepts studied there were six pairs that form well established and conceptually interesting sequences: object permanence 1-object permanence 2; role taking 2-role taking 1; qualitative identity-conservation of liquid; conservation of mass-conservation of weight; conservation of weight-conservation of volume; conservation of mass-conservation of volume. As Table 4 shows, subjects were fairly successful at identifying sequences, indicating the correct ordering (i.e., selecting a younger age for the developmentally earlier concept) in 72% of the cases and a reversal in only 9%. There were no differences among the groups on this measure.

The column labeled "Stage Reversals" refers to cases in which a concept from one stage was dated after a concept from a later stage--for example, a preoperational achievement dated after a concrete operational one. Note that this measure is only partially overlapping with the preceding one, since it does not include the within-stage sequences (e.g., the two object permanence items) but does include all possible between-stage pairings of concepts. There were 56 such pairings in all.[1] As Table 4 indicates, subjects were also fairly accurate on this measure, averaging only 3.88 reversals (the median number was 3). In this case there was a significant sex by parental status interaction, caused by the relatively poor performance of the female parents and the male

nonparents, $F(1,56) = 5.26$, $p < .05$.

The last column in Table 4 indicates the mean number of accurate age judgments. Our procedure in scoring accuracy involved two steps. We first determined, based on the relevant literature, our own best estimate of the most sensible "correct" age for the attainment of each concept. We then scored as correct any age that fell within one-third, plus or minus, of this figure. For example, the age assigned for conservation of mass was 7, and any age between 4 2/3 and 9 1/3 was scored as correct. Similarly, the age assigned for conservation of volume was 12, and any age between 8 and 16 was scored as correct. As can be seen, the criterion was a deliberately generous one, our feeling being that any more stringent specification of "correct" age would not be justified. Despite the generosity of the criterion, subjects averaged only about 7 correct judgments across 13 trials. Again, there were no significant differences among the groups.

Discussion

As noted, it was not possible to make clear predictions regarding how well adults would be able to make judgments about the cognitive abilities studied here. In fact, the picture with respect to accuracy proved to be mixed. Accuracy was fairly good with regard to one very important aspect of cognitive development, namely the relative difficulty of different concepts and hence the temporal order in which they are mastered. Thus, identification of specific sequences was good, and reversals of a stage-to-stage sort were fairly infrequent. Furthermore, judgments with respect to the remaining issues--variability, sex differences, origins--were generally sensible and appropriately attuned to the particular concept in question. It is true, of course, that in

some cases a sensible judgment does not require a great deal of psychological insight--for example, a decision that school teaching is unimportant for a concept mastered during infancy. The inferences were not all so obvious, however; note both the increase in hypothesized sex differences with developmental level and the indication of masculine superiority on the formal-operational pendulum task.

The least impressive aspect of performance concerned the chronological dating of specific acquisitions. The most common errors were of two sorts: overestimation of age for the two object permanence items, and underestimation of age for the formal-operational and late concrete-operational concepts. The former kind of error may have resulted at least in part from a reluctance (despite explicit instructions to the contrary) to answer in months rather than years, especially since the object permanence items were intermixed with so many developmentally later concepts. The latter kind of error, we would suggest, reflects a genuine tendency to overestimate what young children are capable of. It should be emphasized that this overestimation did not result from a few subjects who offered extreme values; in each case the median age was virtually identical to the mean.

There was remarkable similarity in response between males and females and between parents and nonparents. We had expected that differences in experience and in interests might lead to differences in the judgments of the various groups, especially since other measures of responsiveness to children do show effects of sex and parental status (Feldman & Nash, 1978). Two explanations for the absence of differences can be suggested. First, the low volunteer rate may have produced a sample biased in the direction of people especially interested in children,

perhaps in particular among the nonparent group (it was not possible to calculate volunteer rates separately for parents and nonparents, since information about parental status was not available prior to the agreement to participate). Note that any selective factors in the sample would qualify not only the group comparisons but also any normative conclusions about adults' ability to make inferences about children.

The second suggestion concerns the nature of Piagetian knowledge. It is possible to imagine situations in which the abilities sampled here might be fairly directly expressed in children's interactions with adults--for example, hiding games in infancy with respect to object permanence, or conversational exchanges that reveal role-taking deficits. For the most part, however, the kinds of ability studied by Piaget are unlikely to be immediately evident in children's spontaneous behavior. Imagine, for example, how long one would have to observe children before seeing natural instances of conservation or nonconservation of properties such as weight and volume. It may be, then, that variance in response does not relate to direct experience with children because direct experience with children is simply not very helpful for the particular inferences in question.

What other basis might there be for making such judgments? The most obvious alternative would seem to lie in information provided by the logical structure of the tasks themselves. At the extreme, one would hardly need experience with children to realize that the pendulum problem is mastered later in development than is object permanence; simple exposure to the two tasks makes clear that they differ greatly in logical complexity. Similarly (although less obviously),

differences in complexity would seem perceptible for at least most of the between-task sequences discussed earlier. Thus, it simply makes intuitive sense that handling one hiding place should be easier than handling two, that realizing that someone sees a different object should be easier than realizing that someone sees a different perspective on the same object, that recognizing qualitative identity in the face of change should be easier than recognizing quantitative identity, etc. The suggestion, then, is that part of what is tapped here may involve judgments about concepts rather than about children, and that some people are more insightful at this kind of concept analysis than are others.

There are two obvious directions for future research. Important though they may be, Piagetian concepts are just a subset of the cognitive abilities developed during childhood. A broader sampling of children's abilities would permit the examination of a number of interesting questions. For example, are adults more accurate with respect to some aspects of children's development than they are with respect to others? It might be predicted, for example, that inferences would be more accurate regarding relatively overt and demonstrable abilities, such as school-taught knowledge or around-the-house skills, than they are regarding Piagetian concepts. Are differences between parents and nonparents more evident with regard to other types of ability? Do judgments with respect to issues such as sex differences and developmental origins vary as a function of the type of knowledge in question? Is there individual consistency in judgments across different domains of knowledge? Finally, which kinds of inferential judgment show the strongest rela-

tion to adults' actual behavior with children?

The last question brings us to the second proposed extension: inclusion of measures of adults' behavior toward children in conjunction with measures of their conceptions of children. At a very general level, the proposition that the way adults treat children is influenced by what they think children can do would seem unassailable. At a more specific level, however--exactly which inferences about children influence which aspects of behavior in exactly what way--the issue remains virtually unexplored.

Reference Notes

1. Anderson, C. Informing mothers about the behavioral characteristics of their infants. Effects on mother-infant interaction. Paper presented at the meeting of the Society for Research in Child Development, San Francisco, March 1979.

2. Eyler, F.D. Assessment and intervention with mothers and their premature newborns. Paper presented at the meeting of the Society for Research in Child Development, San Francisco, March 1979.

References

Feldman, S.S., & Nash, S.C. Interest in babies during young adulthood. Child Development, 1978, 49, 617-622.

Jones, E.E. The rocky road from acts to dispositions. American Psychologist, 1979, 34, 107-117.

Marascuilo, L.A., & McSweeney, M. Nonparametric and distribution free methods for the social sciences. Monterey, California: Brooks/Cole, 1977.

McCall, R.B., & Applebaum, M.J. Bias in the analysis of repeated-measures designs: Some alternative approaches. Child Development, 1973, 44, 401-415.

Rubin, K.H., & Brown, I.D. A life-span look at person perception and its relationship to communicative interaction. Journal of Gerontology, 1975, 30, 461-468.

Schantz, C.U. The development of social cognition. In E.M. Hetherington (Ed.), Review of child development research (Vol. 5). Chicago: University of Chicago Press, 1975.

Thomas, H., & Jamison, W. On the acquisition of understanding that still water is horizontal. Merrill-Palmer Quarterly, 1975, 21, 34-44.

Footnotes

A shorter version of this paper was presented at the meeting of the Society for Research in Child Development, San Francisco, March, 1979. We are grateful to the Personnel Offices of the City of Gainesville and the University of Florida for their generous cooperation with the study. We also thank Stephen LaTour and Marsha Clarkson for their statistical advice. Author Miller's address: Department of Psychology, University of Florida, Gainesville, Florida 32611.

[1]Although horizontality is considered a concrete operational achievement by Piaget, later research has indicated that its mastery may in some cases come considerably later than middle childhood (e.g., Thomas & Jamison, 1975). It did not seem justified, therefore, to score a stage reversal if the subject assigned a later age to horizontality than to one of the formal operational achievements. Because of this ambiguity in its stage placement, the cross-stage comparisons for horizontality were limited to tasks from the sensorimotor and preoperational periods.

Table 1

Characteristics of the Sample

Group	Mean Age	Mean Years of Education	Percentage Married	Spouse Pairs in Sample	Mean Number of Children	Mean Age of Children
Female Parents	32.1	14.1	87	9	2.1	10.2
Female Nonparents	27.0	15.8	40	4	--	--
Male Parents	35.3	15.5	87	9	2.2	11.5
Male Nonparents	29.6	16.0	33	4	--	--
Female Total	29.5	15.0	63			
Male Total	32.5	15.7	60			
Parent Total	33.7	14.8	87			
Nonparent Total	28.3	15.9	47			

Table 2

Responses to the 13 Piagetian Concepts Summed Across the Four Subject Groups

Concept	Age	Certainty[a]	Variability[b]	Sex Differences[c]	Parental Teaching[d]	School Teaching	Interaction with Peers	Self Discovery	Inborn Knowledge
O-1	1.75	3.40	1.67	07	1.71	2.63	2.43	1.26	1.95
O-2	2.82	3.33	2.02	13	1.58	2.35	2.07	1.35	2.08
RT-2	4.30	3.07	2.41	15	1.55	2.20	2.23	1.60	2.35
RT-1	5.11	2.90	2.90	15	1.62	1.92	2.13	1.68	2.33
QI	3.87	3.03	2.35	07	1.72	2.22	2.22	1.40	2.23
SE	4.88	3.17	2.71	15	1.58	1.80	2.05	1.52	2.38
CJ	6.08	3.03	3.19	27	1.75	1.68	2.10	1.68	2.57
CL	5.69	2.98	2.87	20	1.67	1.65	2.10	1.50	2.42
CM	5.28	2.95	2.94	13	1.65	1.92	2.12	1.48	2.33
CW	6.07	3.05	3.26	22	1.72	1.60	2.27	1.68	2.43
H	7.07	2.90	3.27	30	1.85	1.58	2.30	1.47	2.47
CV	7.59	2.90	3.41	33	1.87	1.38	2.20	1.53	2.43
P	10.38	3.02	4.94	50	1.77	1.25	2.00	1.33	2.47

[a]Possible range from 1 ("Very Unsure") to 5 ("Very Sure").

[b]Difference between youngest and oldest age posited for attainment of the concept.

[c]Percentage of subjects positing a sex difference.

[d]For this and the remaining columns, possible range from 1 ("Very Important") to 3 ("Not Important").

Table 3

Responses of the Four Subject Groups Summed across the 13 Piagetian Concepts

Group	Age	Certainty[a]	Variability[b]	Sex Differences[c]	Parental Teaching[d]	School Teaching	Interaction with Peers	Self Discovery	Inborn Knowledge
Female Parents	5.00	3.03	2.02	31	1.77	1.85	2.27	1.47	2.34
Female Nonparents	5.76	2.98	2.70	15	1.77	1.81	2.14	1.43	2.42
Male Parents	5.31	3.07	2.84	15	1.52	1.80	2.21	1.58	2.54
Male Nonparents	5.74	3.14	4.14	21	1.72	1.98	2.07	1.52	2.07
Female Total	5.38	3.01	2.36	23	1.77	1.83	2.21	1.45	2.38
Male Total	5.53	3.11	3.49	18	1.62	1.89	2.14	1.55	2.31
Parent Total	5.15	3.05	2.43	23	1.65	1.82	2.24	1.53	2.44
Nonparent Total	5.75	3.06	3.42	18	1.74	1.90	2.11	1.47	2.25
All Subjects	5.45	3.06	2.92	21	1.69	1.86	2.17	1.50	2.34

[a]Possible range from 1 ("Very Unsure") to 5 ("Very Sure").

[b]Difference between youngest age and oldest age posited for attainment of a given concept.

[c]Percentage of trials on which a sex difference was posited.

[d]For this and the remaining columns, possible range from 1 ("Very Important") to 3 ("Not Important").

Table 4

Accuracy Measures for the Four Subject Groups

Group	Sequences			Mean Number of Stage Reversals[a]	Mean Number of Accurate Age Judgments[b]
	Percentage Correct	Percentage Tied	Percentage Reversed		
Female Parents	72	19	9	4.60	6.40
Female Nonparents	73	19	8	2.73	7.87
Male Parents	69	21	10	2.67	7.13
Male Nonparents	73	17	10	5.53	6.93
Female Total	73	19	8	3.67	7.13
Male Total	71	19	10	4.10	7.03
Parent Total	71	20	9	3.63	6.77
Nonparent Total	73	18	9	4.13	7.40
All Subjects	72	19	9	3.88	7.08

[a]Total possible = 56.

[b]Total possible = 13.